JPL

Terrestrial Planet Finder Mission

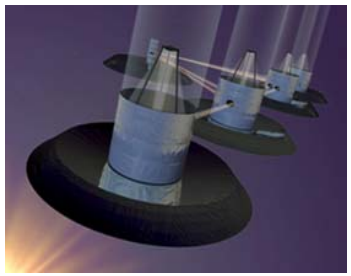
TPF

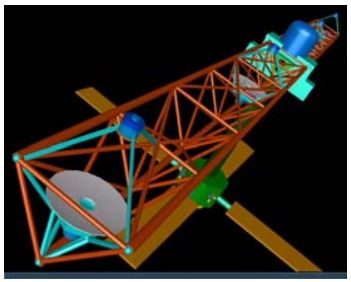
A NASA Origins Mission

TPF Science, Technology & Design Expo

Interferometer Technology Overview

Interferometer Technology



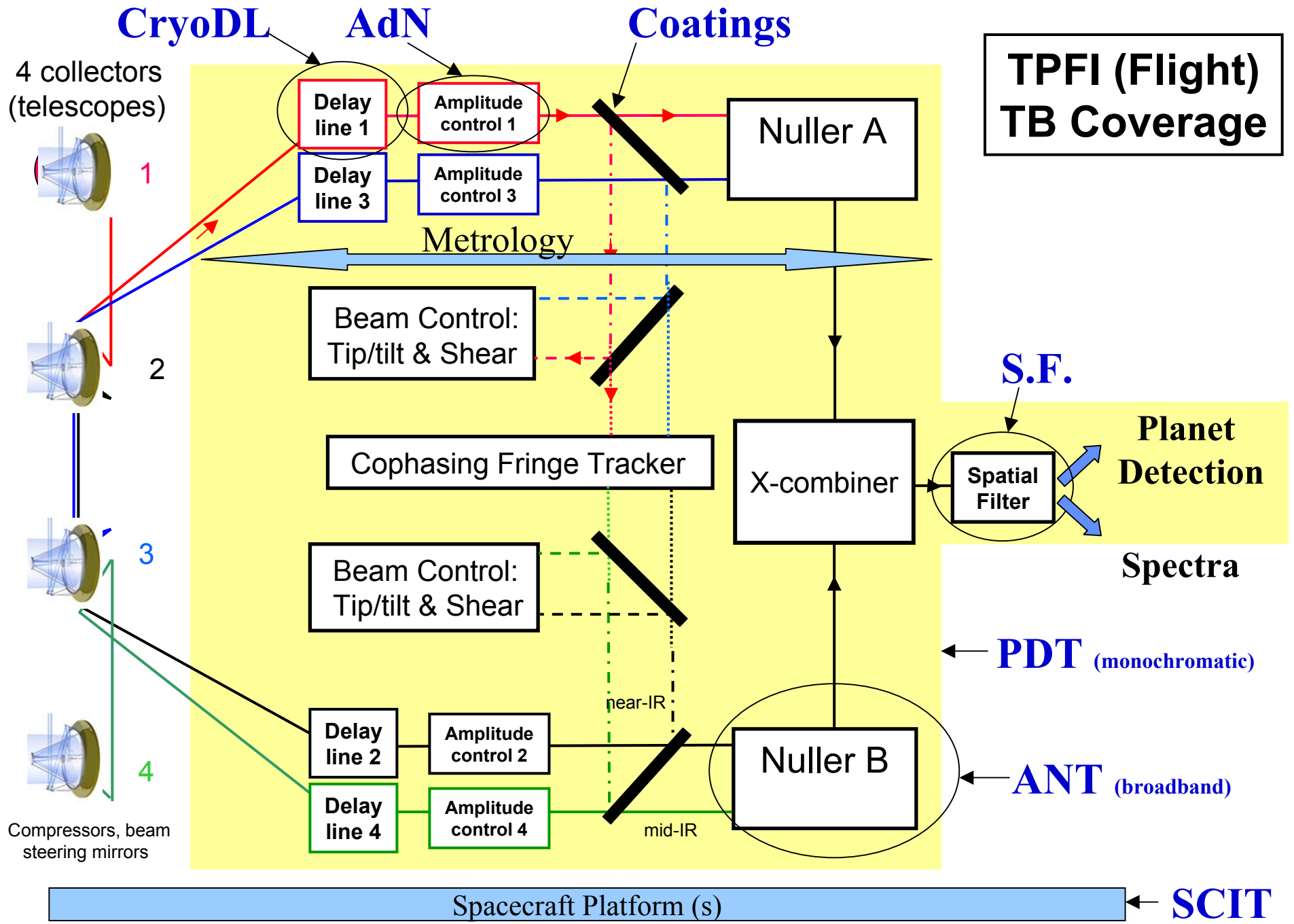


What

- Retire TPF interferometer technical concerns through analysis, development of technologies & hardware demonstrations of end-to-end optical system testbeds.
- Mid-IR spectrum (7-20 μm)
- Cryogenic
- Stability at null depths of ~10^{-6}
- Planet detection at representative light levels

How

- A variety of development activities were conceived to address the key technology concerns. These range from component & device developments to optical train systems level testbeds.
  - Beam Combining Testbeds :
    - Nuller Testbeds – Warm & Cold
    - Planet Detection Testbed
    - Adaptive Nuller Testbed
    - Common Path Phase Sensing Testbed
  - Component & Device Developments:
    - Cryogenic Delay Line
    - Spatial Filters
    - Integrated Optics
    - Optical Materials & Coatings
  - Large Cryogenic Structures:
    - Structurally Connected Interferometer Testbed
    - Cryo Structures – Modeling & Component Testing


CryoDL
AdN
Coatings
TPFI (Flight)
TB Coverage
4 collectors
(telescopes)
1
2
3
4
Delay line 1
Amplitude control 1
Delay line 3
Amplitude control 3
Nuller A
Metrology
Beam Control: Tip/tilt & Shear
S.F.
Cophasing Fringe Tracker
X-combiner
Spatial Filter
Planet Detection
Spectra
Beam Control: Tip/tilt & Shear
PDT (monochromatic)
near-IR
Delay line 2
Amplitude control 2
Delay line 4
Amplitude control 4
Nuller B
ANT (broadband)
mid-IR
Compressors, beam steering mirrors
Spacecraft Platform (s)
SCIT